



Data Analysis Report-June 2005

Listed Waterbodies: Salinas River

(Includes: Alisal Creek, Atascadero Creek, Elkhorn Slough, Gabilan Creek, Old Salinas River Estuary, Salinas Reclamation Canal, Salinas River (lower), San Lorenzo Creek, Tembladero Slough)

Listed Condition: Fecal coliform

Description of sample locations, frequency and results:

Sample locations:

H2OBody	SiteTag	Site Description	Latitude	Longitude
Salinas River	309SALGON	Salinas River at Gonzales Rd.	36.487222	-121.4691667
Salinas River	309SALCHU	Salinas River at Chualar River Rd.	36.5556	-121.5486
Salinas River	309SALDAV	Salinas River at Davis Rd.	36.646667	-121.7025
Salinas River	309SALBLA	Salinas River at Blanco Rd.	36.678056	-121.7452778
Blanco Drain	309BLACOO	Blanco Drain at Cooper Rd. near intersection with Nashua Rd.	36.6983857	-121.7347468
Salinas River	309SALMON	Del Monte Rd.	36.731111	-121.7452778
Old Salinas	309OLSMON	Monterey Dunes Colony Rd.	36.772291	-121.787855
Tembladero Slough	309TEMPRE	Preston Rd. in Castroville	36.765	-121.75917
Tembladero Slough	309TEMMOL	Molera Rd. near intersection w/Monterey Dunes Colony Rd.	36.772183	-121.786597
Old Salinas	309OLSPOT	Potrero Rd. at tidegates	36.7905512	-121.7905511
Salinas River Storm Drain	309SDRPUM	City of Salinas stormwater pumping station near the animal shelter	36.66041	-121.88346
Salinas River	309SDR	Salinas River at Davis Rd. - need to go on private property to access, but have okay from the City of Salinas	36.646667	-121.7025
Gabilan Creek	309GABBOR	Boronda Rd	36.71544024	-120.3835554
Gabilan Creek	309GABCRA	Crazy Horse Rd	36.77137799	-120.3977367
Gabilan Creek	309GABHER	Herbert Rd	36.75575259	-120.3896227
Gabilan Creek	309GABNAT	Natividad Rd	36.73117669	-120.3876118
Gabilan Creek	309GABOSR	Old Stage Rd	36.78053542	-120.4145773
Gabilan Creek	309GABVET	Veterans Park Bridge (off East Laurel and Constitution)	36.69390468	-120.372726
Towne Creek	309TOWOSR	Small bridge near Old Stage Rd	36.80012878	-120.433645
Alisal Creek	309ALIOSR		36.69225351	-120.4310349
Alisal Creek	309ALIAIR		36.661925	-121.621039

The sites listed in the above table are shown graphically in Figures 1-3 below.

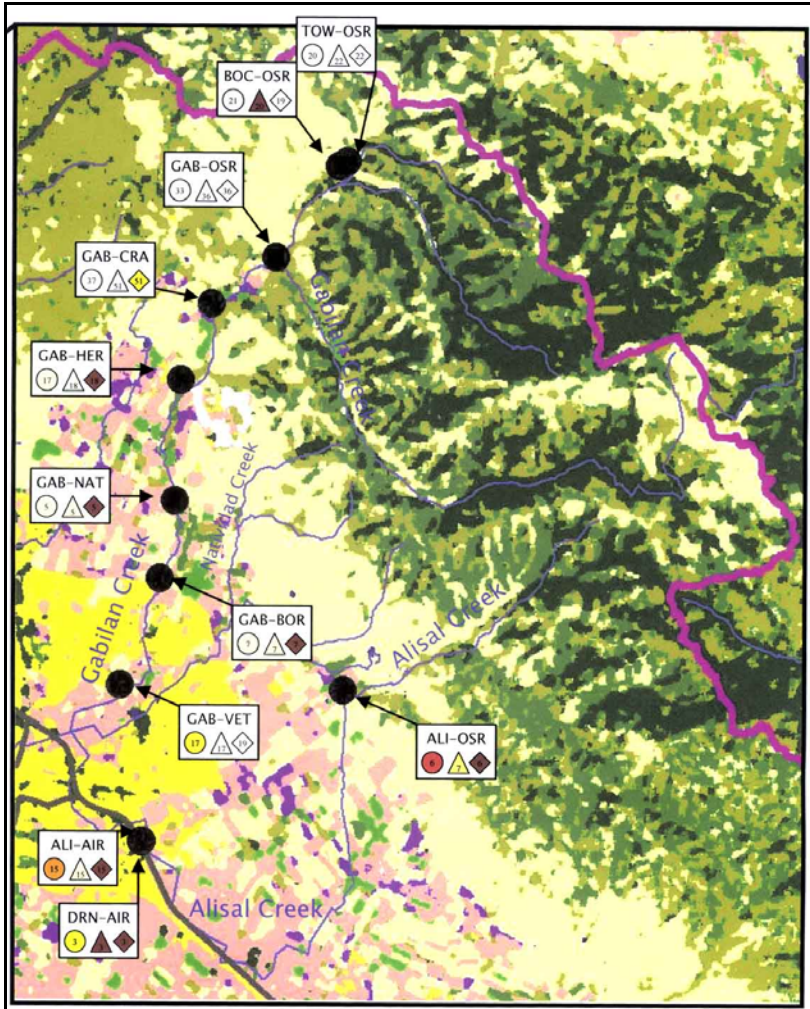


Figure 1: Sample locations for Salinas River fecal coliform TMDL (there are some sites shown on the map that are not being sampled in this project)

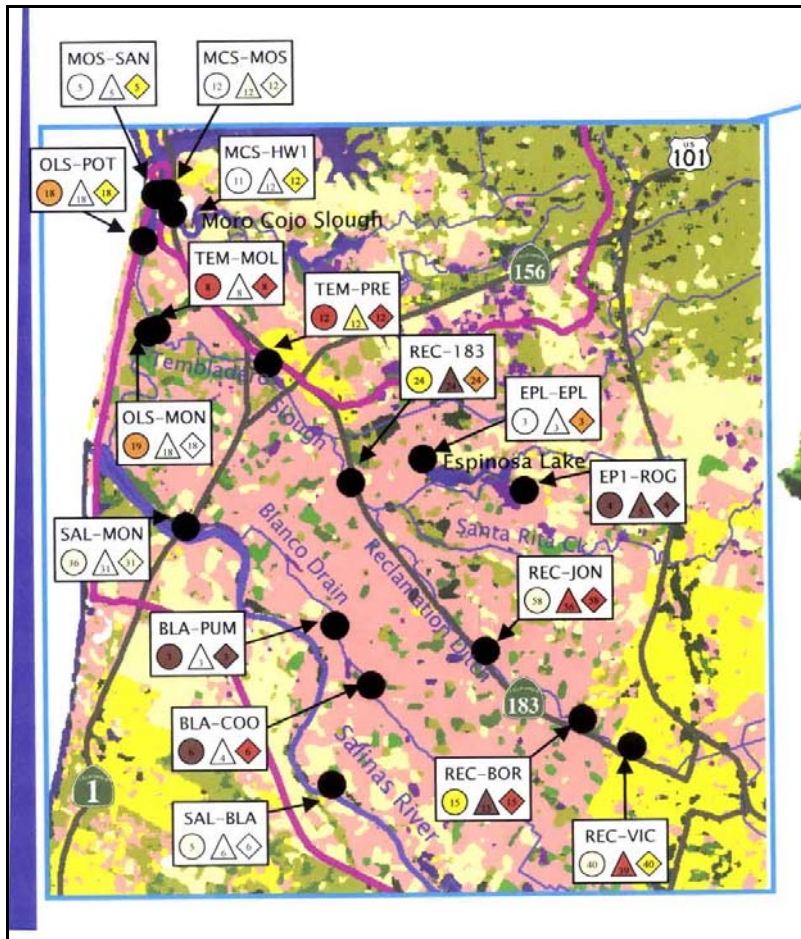


Figure 2: Sample locations for Salinas River fecal coliform TMDL (there are some sites shown on the map that are not being sampled in this project)

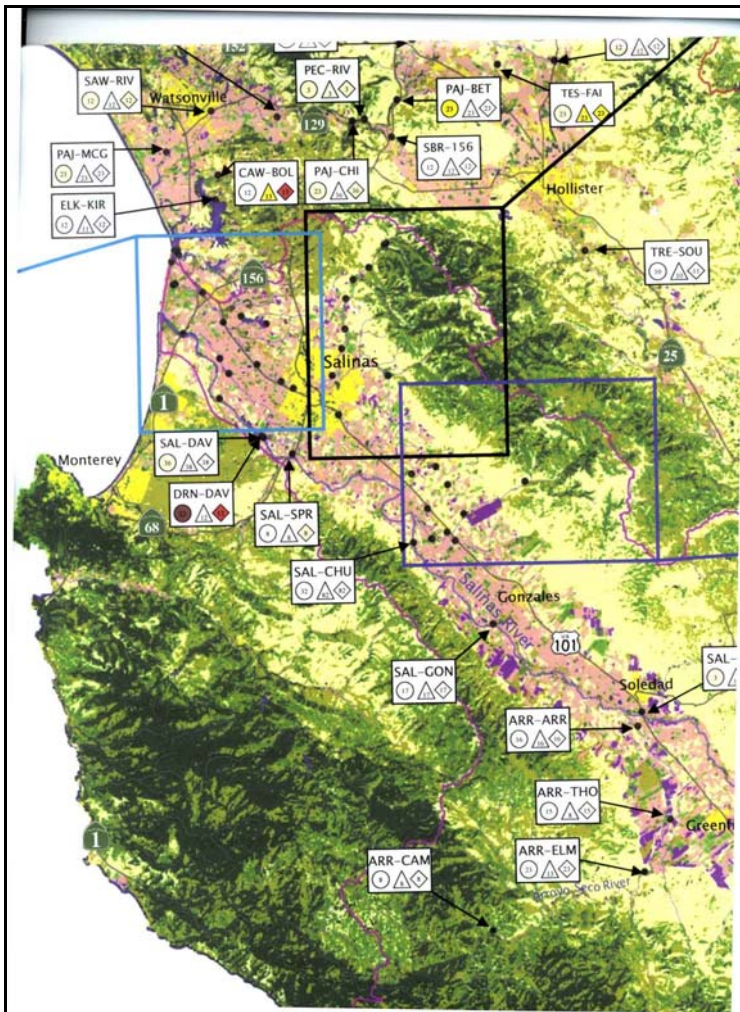


Figure 3: Sample locations for Salinas River fecal coliform TMDL (there are some sites shown on the map that are not being sampled in this project)

Method and Frequency of sampling:

Staff has been collecting samples and analyzing them using IDEXX's Colilert-18 method for *E. coli* and total coliform. This method is less expensive than sending the samples to the lab and yields accurate results.

Regional Board staff have been sampling monthly since November 9, 2004. Sampling would have begun earlier in the fiscal year, but due to staff's illness, it was not feasible to begin sampling until November 2004. Sampling will continue until April 2005.

Sampling results:

November 2004

In November 2004, concentrations of *E. coli* varied from 4.1 MPN to 648.8 MPN, and total coliform from 1,658 MPN to 24,200 MPN. However, during sample analysis, staff may have read the analytical results incorrectly. If staff read the samples incorrectly, the concentrations of total coliform and *E. coli* are at least as high as reported in the spreadsheet¹. In other words, if we

¹ S:\TMDLs & Watershed Assessment\New TMDL and Related Projects- Region 3\Salinas River\Fecal coliform\3 Data Collection\2004 1109 sampling event data sheet

read the samples incorrectly, the actual concentrations of both total coliform and *E. coli* are higher than recorded. Because we are not certain there was an error reading the results, we will use them for qualitative purposes only. Staff found no pattern to explain the variability in the data.

December 2004

In December 2004, 12/16 samples had concentrations exceeding the proposed 235 MPN/100 mL numeric objective for *E. coli*. It was raining when staff took these samples. It is difficult to make any assertions as to why certain locations had higher concentrations than others. Gabilan Creek, which originates above any agricultural areas, had levels of *E. coli* that were as high as the Colilert trays detect without doing subsequent dilutions (i.e. *E. coli* concentration >2419.2 MPN/100 mL). Grazing animals, which have access to the Creek, septic systems, or wildlife may be contributing to these elevated levels. The coliform concentrations in the upper reaches of Gabilan Creek show that elevated levels of coliform in the lower reaches are *not necessarily* originating from the agricultural fields. Samples from areas that drained irrigated agriculture had both elevated levels (1000 – 2000 MPN *E. coli*) and lower levels of coliform (less than 500 MPN *E. coli*). The stormwater sample and the samples that drained urban areas were also elevated as compared to the proposed numeric objective.

January 2005

In January 2005, 17/18 samples exceeded the proposed 235 MPN/100 mL numeric objective for *E. coli*. There was 1.61" of rain the week before sampling and the flow at all sites was high. Staff were able to sample many sites that are regularly dry without rain. *E. coli* samples ranged in value from 23.3 MPN (BLACOO) to 2420.0 MPN. GABOSR has been consistently lower in *E. coli* concentration than the surrounding sites on Gabilan Creek during this and the previous 2 sampling events. Additionally, ALIOSR, had lower values than its downstream site ALIAIR. Other than ALIOSR and GABOSR, there did not seem to be a pattern in levels of *E. coli* being higher/lower upstream or downstream.

February 2005

Staff took 19 samples in February 2005 and 18 of those samples exceeded the 235 MPN/100 mL numeric objective for *E. coli*. The only site that did not exceed the objective was BLACOO. This represents yet another month where BLACOO had the lowest concentration of *E. coli* compared to all other sites. This is noteworthy because this site drains agricultural area on all sides. Again, significant rainfall occurred the week before sampling took place (1.33"). Once again, while GABOSR was above the water quality objective, it was still considerably lower than the other sites along Gabilan Creek. The sites on the main stem of the Salinas had lower overall *E. coli* values than Gabilan, Old Salinas and Tembladero Slough. This seems to hold true for all previous sampling events as well. *E. coli* isolation analysis was performed on samples collected. Six of 19 samples were positive for O157:H7.

March 2005

Staff took 14 samples in March 2005. All of the samples exceed the 235 MPN/100 mL numeric objective for *E. coli*. March was a month with a significant amount of rain. It was raining the day of data collection. Fields were flooded in the lower portion of the watershed. All flows were highly turbid. *E. coli* isolation analysis was performed on samples collected. Six of 14 samples were positive for O157:H7.

April 2005

Staff took 19 samples in April 2005. Five of the 19 samples exceeded the 235 MPN/100 mL numeric objective for *E. coli*. There had been no rain for nearly a month. Some tributaries were not flowing. All samples negative for O157:H7 *E. coli*.

May 2005

No samples were taken in May 2005

June 2005

Staff took 18 samples in June 2005. Ten of the 18 samples exceeded the 235 MPN/100 mL numeric objective for *E. coli*. Some tributaries beginning to have less turbid flows, relative to previous sampling events. All samples negative for O157:H7 *E. coli*.

O157:H7

Analysis for the presence of O157:H7 was performed by USDA research center in Albany California. Positive results for the pathogenic *E. coli* in February and March followed monitoring sites linearly connected. In addition, positive results between February and March were seen in four of the five monitoring sites tested, i.e., in four of the sites that were positive in March were also positive for O157:H6 in February. Finally, only positive results occurred following and during rain events whereas dry weather yields negative results for O157:H7. The initial results lead staff to questions whether the O157:H7 coliform is being transported through overland flow during wet weather conditions. Regional Board staff, as well as DHS and USDA staff continue to conduct field monitoring and analysis in an effort to pinpoint source(s) of the coliform.

Continuing Research

Regional Board staff will enter into an inter-agency agreement with DHS to continue to analysis into the source of the O157:H7. The agreement includes state source funds of \$51,000 for O157:H7 isolation and fingerprinting analysis. It is expected that the funds will be available in the first quarter of the 2005-2006 fiscal year. DHS will manage the funds.

Review of other data

Coordination with Department of Health Services (DHS) and United States Department of Agriculture (USDA)

Staff have been coordinating with DHS and USDA in an effort to identify sources of the pathogenic *E. coli* O157:H7. USDA microbiologists are conducting speciation of samples gathered by staff in an effort to isolate the O157:H7 bacteria. This coordination will continue through the calendar 2005. Positive identification of the O157:H7 have been identified from samples drawn from the Gabilan sites and sites downstream, including Tembladero Slough and the Old Salinas River Estuary. O157:H7 have only been identified during wet months.

City of Salinas Storm Water Monitoring Program:

The City of Salinas has been collecting data on Santa Rita Creek, Gabilan Creek, Natividad Creek and the Reclamation Ditch since May 2000. They have been sampling approximately twice a year (May 2000, Dec. 2000, April 2001, November 2001, June 2002, January 2003, and June 2003). Sampling sites may change at a future date.

Staff found that 80% of the samples collected by the City of Salinas exceeded the 200 MPN/100 mL REC-1 water quality objective for fecal coliform (112 samples collected during this time period, 90 samples exceeded).

Staff did not observe any trend of fecal coliform increasing or decreasing when plotting the data from upstream to downstream location for each creek².

It is difficult to see a trend when the data are plotted seasonally. This may be because of the close proximity of the sampling sites to each other and due to the fact that some sites dry up during the summertime and therefore cannot be sampled.

All that can be deduced from these data at this time is that the REC-1 water quality objectives are being consistently violated within the City limits. However, it is still not clear what the sources are and if there is a pattern to the exceedences.

Monterey County Waste Discharge Requirements (WDRs)

There are many Waster Water Treatment Plants (WWTPs) in close proximity to the Salinas River and its tributaries. All of these plants (with the exception of one that discharges to the ocean) are land discharges³ and do not appear to be affecting water quality. Since WWTPs that discharge to land are not required by their WDRs to sample upstream and downstream of their facility, it is difficult to definitively state that they are not causing any impact. However, based on their practices, it would be highly unlikely that these facilities would have an effect on the bacterial concentration of these waters. In order to confirm the above stated assumptions, staff could issue a 13267 letter requesting that sampling be performed upstream and downstream of the site(s).

Confined Animal Facilities

There is one permitted confined animal facilities within Monterey County, that is just on the south side of Elkhorn Slough. There may be some very small confined animal facilities, dairy operations for example, that are not permitted in the area. It would be useful to investigate this further (Monterey County would be the agency to contact).

NPDES permits (non-stormwater)

There are several vegetable processing plants in the area. Two of these plants (Uni-Kool operates two facilities; West Market St. and Abbott St.) drain to the Salinas Reclamation Canal. They sample for coliform once a year. The 2004 report shows that a sample taken from the West Market St. facility's discharge water had a concentration of 240 MPN fecal coliform. A fecal coliform reading was not found for the Abbot St. facility. There are other facilities that discharge to land and these facilities do not sample for coliform. They are not suspected as contributing to bacterial input at this point; however, it may be worth researching this issue further in the future.

² S:\TMDLs & Watershed Assessment\New TMDL and Related Projects- Region 3\Salinas River\Fecal coliform\3 Data Collection\City of Salinas Stormwater data

³ S:\TMDLs & Watershed Assessment\New TMDL and Related Projects- Region 3\Salinas River\Fecal coliform\3 Data Collection\Salinas WWTPs

Data

SiteTag	DateTime	ECOLI MPN/100mL	TCOLI MPN/100mL	FCOLI MPN/100mL	O157:H7 1=y,2=n
309GABOSR	11/9/04 12:00 AM				
309SALCHU	11/9/04 12:00 AM				
309SALGON	11/9/04 12:00 AM				
309TOWOSR	11/9/04 12:00 AM				
309TEMPRE	11/9/04 10:15 AM	325.5	2420.0		
309TEMPRE	11/9/04 10:15 AM	272.0	24200.0		
309OLSPOT	11/9/04 10:45 AM	121.0	24200.0		
309OLSPOT	11/9/04 10:45 AM	57.8	2420.0		
309OLSMON	11/9/04 11:00 AM	648.8	2420.0		
309OLSMON	11/9/04 11:00 AM	256.0	7215.0		
309TEMMOL	11/9/04 11:10 AM	203.0	24200.0		
309TEMMOL	11/9/04 11:10 AM	178.5	2420.0		
309SALMON	11/9/04 11:30 AM	39.1	2420.0		
309SALMON	11/9/04 11:30 AM	27.5	2420.0		
309SALMON	11/9/04 11:30 AM	10.0	5475.0		
309SALMON	11/9/04 11:30 AM	10.0	3654.0		
309BLACOO	11/9/04 11:45 AM	61.0	17329.0		
309BLACOO	11/9/04 11:45 AM	28.8	2420.0		
309SALBLA	11/9/04 12:00 PM	169.0	12997.0		
309SALBLA	11/9/04 12:00 PM	122.3	2420.0		
309SALDAV	11/9/04 1:00 PM	58.3	2420.0		
309SALDAV	11/9/04 1:00 PM	31.0	6867.0		
309SDR	11/9/04 1:15 PM	20.0	1658.0		
309SDR	11/9/04 1:15 PM	9.7	1986.3		
309SDRPUM	11/9/04 1:50 PM	224.7	7.2		
309SDRPUM	11/9/04 1:50 PM	185.0	24200.0		
309GABVET	11/9/04 2:35 PM	30.0	10464.0		
309GABVET	11/9/04 2:35 PM	27.2	2420.0		
309GABVET	11/9/04 2:35 PM	21.6	2420.0		
309GABVET	11/9/04 2:35 PM	10.0	8664.0		
309GABVET	11/9/04 2:50 PM	10	2141		
309GABVET	11/9/04 2:50 PM	4.1	2149.2		
309GABHER	11/9/04 3:00 PM				
309GABCRA	11/9/04 3:15 PM				
309GABNAT	11/9/04 3:25 PM				
309ALIOSR	11/9/04 3:50 PM				
309ALIAIR	11/9/04 4:00 PM	33.1	2420.0		
309ALIAIR	11/9/04 4:00 PM	31.0	24200.0		
309ALIOSR	12/7/04 12:00 AM				
309SALCHU	12/7/04 12:00 AM				
309SALGON	12/7/04 12:00 AM				
309SDR	12/7/04 12:00 AM				
309ALIAIR	12/7/04 11:47 AM	1732.9	2420.0		
309GABCRA	12/7/04 12:19 PM	2420.0	2420.0		
309GABOSR	12/7/04 12:25 PM	153.9	2420.0		
309TOWOSR	12/7/04 12:35 PM	2420.0	2420.0		
309GABHER	12/7/04 12:45 PM	2420.0	2420.0		

309GABNAT	12/7/04 12:55 PM	2420.0	2420.0		
309GABVET	12/7/04 1:15 PM	2420.0	2420.0		
309SDRPUM	12/7/04 1:45 PM	2420.0	2420.0		
309SALDAV	12/7/04 1:55 PM	2420.0	2420.0		
309SALBLA	12/7/04 2:05 PM	307.6	2420.0		
309BLACOO	12/7/04 2:15 PM	1119.9	2420.0		
309SALMON	12/7/04 2:30 PM	57.3	2420.0		
309OLSMON	12/7/04 2:35 PM	151.5	2420.0		
309TEMMOL	12/7/04 2:40 PM	1986.3	2420.0		
309OLSPOT	12/7/04 2:50 PM	1986.3	2420.0		
309TEMPRE	12/7/04 3:00 PM	2419.2	2420.0		
309ALIAIR	1/12/05 10:00 AM	2420.0	2420		
309ALIOSR	1/12/05 10:20 AM	980.4	2420		
309GABCRA	1/12/05 10:40 AM	1203.3	2420		
309TOWOSR	1/12/05 10:50 AM	686.7	2420		
309GABOSR	1/12/05 10:55 AM	325.5	2420		
309GABHER	1/12/05 11:10 AM	1203.3	2420		
309GABNAT	1/12/05 11:20 AM	1732.9	2420		
309GABVET	1/12/05 11:30 AM	1413.6	2420		
309SDRPUM	1/12/05 12:10 PM	2149.2	2420		
309SALDAV	1/12/05 12:15 PM				
309SDR	1/12/05 12:20 PM				
309SALBLA	1/12/05 12:50 PM	920.8	2420		
309SALBLA	1/12/05 12:50 PM	613.1	2420		
309BLACOO	1/12/05 1:55 PM	23.3	2420		
309SALMON	1/12/05 2:10 PM	816.4	2420		
309OLSMON	1/12/05 2:20 PM	2420.0	2420		
309TEMMOL	1/12/05 2:30 PM	2420.0	2420		
309OLSPOT	1/12/05 2:40 PM	2420.0	2420		
309TEMPRE	1/12/05 2:45 PM	2420.0	2420		
309TEMPRE	1/12/05 2:45 PM	2420.0	2420		
309SALCHU	1/12/05 3:35 PM	866.4	2420		
309SALGON	1/12/05 3:50 PM	727.0	2420		
309ALIOSR	2/16/05 12:00 AM				
309SDR	2/16/05 12:00 AM				
309ALIAIR	2/16/05 10:25 AM	2420.0	2420.0		
309GABCRA	2/16/05 10:55 AM	1119.9	2420.0		
309TOWOSR	2/16/05 11:10 AM	1986.3	2420.0		
309GABOSR	2/16/05 11:15 AM	648.8	2420.0		
309GABHER	2/16/05 11:30 AM	2420	2420.0		1
309GABNAT	2/16/05 11:45 AM	2419.2	2420.0		1
309GABVET	2/16/05 12:05 PM	2420.0	2420.0		1
309SDRPUM	2/16/05 12:25 PM	1299.7	2420.0		
309SALDAV	2/16/05 12:35 PM	488.4	2420.0		
309SALBLA	2/16/05 1:25 PM	344.8	2420.0		
309BLACOO	2/16/05 1:35 PM	137.4	2420.0		
309SALMON	2/16/05 1:50 PM	1046.2	2420.0		
309OLSMON	2/16/05 2:00 PM	1119.9	2420.0		
309TEMMOL	2/16/05 2:03 PM	2420.0	2420.0		1
309OLSPOT	2/16/05 2:10 PM	2420.0	2420.0		1

309TEMPRE	2/16/05 2:25 PM	2420.0	2420.0		1
309SALCHU	2/16/05 2:55 PM	866.4	2420.0		
309SALGON	2/16/05 3:10 PM	770.1	2420.0		
309SALGON	2/16/05 3:10 PM	435.2	2420.0		
309GABNAT	3/23/05 8:46 AM	2419.2	2419.2	1	
309TOWOSR	3/23/05 9:10 AM	2419.2	2419.2	1	
309GABOSR	3/23/05 9:15 AM	2419.2	2419.2	1	1
309GABCRA	3/23/05 9:25 AM	2419.2	2419.2	1	
309GABHER	3/23/05 9:45 AM	2419.2	2419.2	1	1
309GABVET	3/23/05 10:00 AM	2419.2	2419.2	1	1
309SDRPUM	3/23/05 10:20 AM	2419.2	2419.2	1	
309SALBLA	3/23/05 10:50 AM	2419.2	2419.2	1	
309SALMON	3/23/05 11:35 AM	2419.2	2419.2	1	
309OLSMON	3/23/05 11:50 AM	2419.2	2419.2	1	
309TEMMOL	3/23/05 11:55 AM	2419.2	2419.2	1	1
309OLSPOT	3/23/05 12:05 PM	2419.2	2419.2	1	1
309TEMPRE	3/23/05 12:15 PM	2419.2	2419.2	1	1
309TEMPRE	3/23/05 12:15 PM	2419.2	2419.2	1	
309SALGON	4/20/05 9:05 AM	3	6488	3	2
309SALGON	4/20/05 9:05 AM	2	6131	2	2
309SALCHU	4/20/05 9:35 AM	21	1046	21	2
309ALIAIR	4/20/05 10:05 AM	2	93	2	2
309TOWOSR	4/20/05 10:35 AM	638	3130	638	2
309GABOSR	4/20/05 10:45 AM	158	1553	158	2
309GABCRA	4/20/05 10:50 AM	504	2909	504	2
309GABHER	4/20/05 11:00 AM	35	687	35	2
309GABVET	4/20/05 11:30 AM	10	7270	10	2
309SDRPUM	4/20/05 12:15 PM	765	24192	765	2
309SALDAV	4/20/05 12:30 PM	31	4884	31	2
309SALBLA	4/20/05 1:30 PM	86	5475	86	2
309BLACOO	4/20/05 1:45 PM	299	1733	299	2
309OLSMON	4/20/05 2:10 PM	122	15531	122	2
309TEMMOL	4/20/05 2:15 PM	233	24192	233	2
309OLSPOT	4/20/05 2:25 PM	160	24192	160	2
309TEMPRE	4/20/05 2:35 PM	373	24192	373	2
309GABDAI	4/20/05 3:00 PM	200	48840	200	2
309SALMON	4/20/05 14:00 PM	10	5475	10	2
Blank	4/21/2005 14:00 PM	0	0	0	
309SALGON	6/20/05 11:30	228	50		2
309SALCHU	6/20/05 11:48	50	41		2
309ALIAIR	6/20/05 12:15	727	649		2
309TOWOSR	6/20/05 12:53	291	291		2
309GABOSR	6/20/05 13:00	579	548		2
309GABCRA	6/20/05 13:09	>2419	488		2
309GABHER	6/20/05 13:20	1986	435		2
309SRCCOR	6/20/05 13:45	2419	1732		2
309GABVET	6/20/05 14:00	125	93		2
309SRCCTY	6/20/05 14:25	>24192	980		2
309BLACOO	6/20/05 14:55	1986	649		2
309SALBLA	6/20/05 15:15	2419	20		2

309OLSMON	6/20/05 16:30	>2419	1388		2
309TEMMOL	6/20/05 16:35	7215	74		2
309SALMON	6/20/05 16:35	24192	0		2
309OLSPOT	6/20/05 16:45	1733	20		2
309TEMPRE	6/20/05 16:55	3968	345		2
309SALDAV	6/20/05 17:15	2981	25		2

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